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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,244	10/24/2003	Takatoshi Tsujimura	CMO.0012US (92096US)	1416

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TROP PRUNER & HU, PC
1616 S. VOSS ROAD, SUITE 750
HOUSTON, TX 77057-2631

EXAMINER	
TUROCY, DAVID P	
ART UNIT	**PAPER NUMBER**
1792	

MAIL DATE	DELIVERY MODE
10/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/693,244	TSUJIMURA ET AL.	
	Examiner	Art Unit	
	David Turocy	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *10 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-8,10,12-14,17,18 and 26-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-8,10,12-14,17,18 and 26-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/10/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The indicated allowability of claims is withdrawn in view of the newly discovered reference(s) to Constant et al. Rejections based on the newly cited reference(s) follow.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 9/10/2007 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 3-8, 10, 12-14, 17-18, 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5686349 by Nakata, hereafter Nakata '349 in view of "Thin film transistors based on Microcrystalline silicon on polyimide substrates" by Constant et al., hereafter Constant or visa versa.

Nakata '349 teaches a method of forming a microcrystalline thin film comprising a first process of supplying SiH_4 and H_2 comprising gases into a chamber with a substrate, a second process of supplying H_2 alone to the chamber and repeating the first and second process a plurality of times without removing the substrate from the chamber (Abstract, Example 1). Nakata '349 discloses supplying H_2 at a constant rate during both the first and second process and SiH_4 has a first rate during the first process and is not supplied during the second process (Example 1). Nakata '349 discloses repeating the first process and second process to deposit a microcrystalline thin film of desired thickness (Column 5, lines 60-64).

While the examiner notes the process as taught by Nakata '349 does not teach of depositing a portion of the microcrystalline thin film in the second step, it is the examiners position that after stopping the flow of SiH_4, the process of Nakata '349 inherently results in at least a quantitative amount of continual deposition, during the second step, at which H_2 is maintained at a constant rate, due to the presence of SiH_4 and H_2 remaining in the process chamber. The hydrogen plasma is taught to start immediately after stopping the flow of silane and therefore it is the examiners position

that a quantitative amount of time exists prior to exhausting all of the supplied silane through exhaust pipe (5). While, as evidenced by the declaration filed 9/29/2006, the residual silane will deposit as amorphous, the amorphous deposition will in turn be converted to microcrystalline thin film and therefore the process reads on depositing a portion of the overall microcrystalline thin film during the second process.

The examiner notes the claim as written only requires that a portion of the microcrystalline thin film is deposited during the second step and does not require no thin film deposition during the first step or that no amorphous thin film is deposited during the second process and then converted to microcrystalline.

Nakata '349 fails to discloses supplying SiH_4 at a first rate and H_2 second rate, wherein the ratio of SiH_4 to H_2 prevents the formation of the film on the substrate from being amorphous. However, Constant discloses the flow ratio is a known result effective variable, see figure 3, which discloses that the ratio directly affects the formation of microcrystalline versus amorphous films. Additionally, Constant discloses applying an electric field to the silane/hydrogen ratio, figure 3. Therefore, taking the references collectively, one of ordinary skill in the art would have modified Nakata '349 in view of Constant to supply the gas in a ratio that will prevent the formation of amorphous silicon with a reasonable expectation of providing a predictable results of microcrystalline film deposition.

Additionally, all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded

predictable results to one of ordinary skill in the art at the time of the invention. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Nakata '349 in view of Constant or visa versa fails to explicitly teach of converting the SiH_4 to SiH_2, which contains a polymer-forming element, by the application of the electric field. However, as evidenced by the admitted state of the art discloses when applying a high-energy electric field to the SiH_4 is broken down into a more reactive SiH_2, which may form a polymer by bonding to each other (Specification Page 3). In addition a flow ratio and an electric field density, which satisfy the relationship as, taught by claim 13, must necessarily result in the formation of the polymer forming SiH_2.

Nakata '349 teaches of supplying the gases with a flow rate ratio, r, equal to 100 and an electric field intensity, P, of 1000 mW/Cm^2, which satisfies the relationship as claimed (Example 1). The hydrogen plasma is taught to start immediately after stopping the flow of silane and therefore it is the examiners position that a quantitative amount of time exists prior to exhausting all of the supplied silane through exhaust pipe (5).

Therefore, the prior art and the present claims, reflected by claim 4, teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by applying an electric field in the chamber with SiH_4 and H_2, with a flow rate ratio and electric intensity satisfying the claimed relationship, it must necessarily result in breaking the SiH_4 to a third gas SiH_2, or activating the source gas to contain an element which forms a polymer due to bonding. Either 1) the applicant and the prior art have different

definitions of applying an high-intensity electric field, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

While the examiner notes the process as taught by Nakata '349 in view of Constant or visa versa does not teach of depositing a third gas, SiH_2, to a surface of the substrate in the second step, it is the examiners position that after stopping the flow of SiH_4, the process of Nakata '349 inherently results in at least a quantitative amount of continual deposition of SiH_2, during the second step, at which H_2 is maintained at a constant rate, due to the presence of a small SiH_4 and H_2 remaining in the process chamber for a quantitative amount of time prior to the exhausting of the gases through exhaust path (5).

The prior art and the present claims, reflected by claim 8, teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by supplying the second gas during a portion of the deposition of the third gas, it must necessarily result in reduction of formation of the polymer of the third gas prior to deposition. Either 1) the applicant and the prior art have different definitions of depositing the third gas during the second process without the first process gas, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-

2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David Turocy/
Patent Examiner
AU 1792

FRED J. PARKER
PRIMARY EXAMINER